Research on Fuzzy Comprehensive Evaluation of Teaching Quality of Public P. e Class in Colleges and Universities Based on Grey System Theory

Chen Hui

Guangzhou Huali Science and Technology Vocational College, Guangdong, China

Keywords: Grey theory, Dedicated model, University, Fuzzy comprehensive

Abstract: Grey prediction is an important part of the grey system theory. It is also the basis of grey decision-making and control. And this theory is characterized by its "poor information" and "dynamic". It shows unique and important application value in all disciplines. In the field of sports, grey prediction is the most popular grey method of sports research after the grey relation. Its practical value is far higher than the grey relational method. This method is one of the most important grey scientific research methods in the field of physical education.

1. Introduction

This comprehensive error has hindered the normal development of Grey Theory in the field of physical education. In this context, this paper starts with three aspects of the application of grey modelling prediction. These three aspects include model characteristics, model analysis factors and modelling methods. These methods include "dedicated model" and "general model", "multi factor model" and "single factor model", "single model" and "combined model". These models are constructed with three levels of high, medium and low levels, which are suitable for the grey prediction theory framework of competitive sports field. And the three levels from low to high are defined as "general model layer", "general professional model layer" and "advanced professional model layer". In this paper, the application of the grey prediction method in the three model levels in competitive sports is analysed in detail. In the general model layer, the most common and basic problems about the grey prediction method of competitive sports are mainly discussed (Fan, 2017).

It involves: GM (1, 1) model method and its inspection way, the choice of grey model's original data dimension, the realization of medium and long term prediction work, the improvement of grey model prediction accuracy and the solution of large fluctuation events prediction problem. In the general professional model layer, we mainly study the specific prediction work with competitive sports characteristics. This model is designed specifically for the particularity of the individual events of competitive sports. This kind of event is very rich, and the models used are relatively large (Han, 2010). And a grey model is not the only one for the same event. Here from the "single factor single model" and "single factor combination model" two aspects. Each of the two actual events is given a specific analysis. The two practical events are: the "turning point prediction problem" and "non-continuous event prediction problem" in the single factor single model, and the "periodic mutation prediction problem" and the "irregular wave prediction problem" in the single factor combination model respectively. However, the practical application of grey prediction method in the field of sports is serious.

2. Advanced professional model layer

In the advanced professional model layer, this paper mainly discusses the problem of predicting multi factor complex events (Hou, 2013). Because the multi factor model does not have the predictive function itself. Therefore, the high-level professional model layer is only one kind of "multi factor combination model". Only by combining the GM (n, H) model with the GM (1, 1) model can the prediction work be completed. There are not many ways to solve such problems. The main method is to use the "system prediction method" (including: "system structure prediction", "system coordination prediction" and "system control prediction"). But in the actual work, the

operator is usually unable to meet the application precondition of the system prediction. Therefore, the article also introduces a simple and common method, that is, GM (1, 2) and GM (1, 1) combined model prediction method. The grey prediction method has the prospect of application in competitive sports. From the above three levels, the general model layer has no larger research space. These emphasis is on the popularization and popularization of the theory and method. The general professional model layer is the key area for the research workers of sports grey theory. There are still many grey prediction methods for sports special events to be developed. The advanced professional model layer theory is relatively complex, and it is not easy to popularize and popularize. But its practical application is of the highest value. Therefore, the future development direction should be to develop software products with professional features in order to better apply to the practice of competitive sports.

2.1 Training process

The exercise training process is the diagnosis of the starting state of the athletes. This process includes the establishment of training objectives, the formulation of training plans, the implementation of training activities, the examination and evaluation of training process, the six basic parts of training control and the realization of goals. The entire exercise training process is almost subject to internal and external factors such as physical, psychological, and external factors such as social and environmental factors.

So the whole process shows huge complexity and instability. This instability, on the one hand, is caused by uncertainty of factors, and on the other hand it is caused by the uncertainty relationship between factors. Therefore, the discussion of sports training is not all black or completely white. It is quite feasible to use the uncertainty mathematics as its research means (Wang, 2012). Grey system theory was founded in 1982 by Professor Deng. In just 20 years, its theoretical structure and application scope have been greatly expanded and developed. The theory has a unique effect on the short time series, less statistical data, and the modelling and analysis of incomplete information systems. Therefore, it has been widely used in many fields, such as society, science and technology (see figure 1), technology and so on. At present, the grey system theory is also one of the fastest and most effective methods in the application of new science and technology in the field of physical education.



Fig.1 Grey System Theory

2.2 The application of grey system

The study of the application of grey system in the training process has been carried out for many years. However, (Feng, 2017), the means of research are mostly concentrated in the field of grey

correlation analysis and performance prediction. The research project focuses on the diagnostic evaluation of the competitive ability of the measurable and technical projects. However, the research on the theory and method of systematic research on the implementation of sports training is obviously deficient. Therefore, on the basis of systematic analysis, this paper uses the method of grey mathematics to establish the system model (Xiang, 2010).

The organization and management of sports training process is studied. The specific research is as follows: in the athletics diagnosis of athletes (see figure 2). The diagnostic method is composed of different characteristics and effects of grey correlation analysis. The diagnosis system is evaluated through multilevel and multi-level comprehensive evaluation. It can not only diagnose the multi structure problems such as the whole, the level and the elements. And the problem of spatiotemporal change can be classified into the system of diagnosis. In the establishment of sports training goals (Liuqian, 2010).



Fig.2 System Platform

3. Targeted sports training goals

Different training stages need to develop targeted sports training goals. On the basis of qualitative analysis, the GM (1, 1) model is the basic basis. This set up a number of grey forecasting models, which are in a turning period, with multiple factors, unequivocal distance, high growth period and a certain fluctuation trend. This will improve the feasibility and accuracy of the training target. In the formulation of a sports training program. Difficulty diagnosis of different competitive abilities (see figure 3). Through the grey GM (1, N) coordination model and the grey multi-objective programming model, the exercise training process is effectively decomposed (Liang, 2013). This can make a practical training plan. In the implementation of sports training activities.



Fig.3 Grey Gm

3.1 Different grey information measure

First, the different grey information measure is used. The variation of the real-time information

sequence in the process of exercise training is diagnosed. Then, the grey three data model is used. The real-time "new information" prediction control is carried out on the basis of the grey difference information measure analysis. Finally, the grey level decision method is used to optimize the method and means in the process of training. In the evaluation and adjustment of sports training process. First of all, the grey statistical clustering method and grey relational multi-level evaluation methods are used to evaluate the effect of sports training. Then, on the basis of the evaluation, the grey matrix of different sports events is established. The grey matrix is used to control and decrease the training grey matrix. Finally, the index of sports training is corrected. The phased optimization training plan has reached the goal of approaching the original plan (Xie, 2014).

3.2 Economic influence

In recent years, with the continuous, rapid and healthy development of our economy, the main functions of the government have begun to change to the provision of public goods and basic public services. The level of public service management performance has become an important symbol to measure the ability of local government. Performance evaluation is a practical tool for evaluating the performance of local government public service management (Xie, 2014). This is gradually used in the practice of public service management at all levels of government. This paper discusses the application of grey system theory in the performance evaluation of local government public service management.

The study of system science, the existence of internal and external disturbances and the limitation of the level of understanding. The information people get often has some kind of uncertainty. With the development of the level of science and technology and the progress of the human society, people's understanding of the uncertainty of the system has been gradually deepened. The research of this uncertain system is growing in depth. The grey system theory focuses on the problem of "small sample" and "poor information", which are difficult to be solved by probability and statistics, fuzzy mathematics and so on. According to information coverage, the article explores the rules of movement by generating, developing and extracting valuable information from known data. In addition, the grey system theory has no special requirements and restrictions on the data. It is widely used in the field of application (Peng, 2016). Grey prediction is an important part of the grey system theory. It is also a very active field of research. The existing literature mainly begins with initial value, background value, grey derivative, discretization, model parameters and morbid nature. In this paper, the grey prediction model is studied, and the fruitful results have been achieved in this paper. However, there are still some gray forecasting technology to be solved the problem in theory (Yang, 2010).



Fig.4 System Model

3.3 Research results

The research results show that the theory is helpful to broaden the thinking of local government performance evaluation and has certain practical value (Liu, 2014). The grey relational analysis method used in this paper is suitable for dealing with small sample, uncertainty and multivariable.

This avoids the influence of subjective empowerment on the evaluation results. The calculation method of the model is simple and the objective of the evaluation results is strong (see figure 4). This is more in line with the requirements of the performance evaluation of the local government's public service management, and this provides a new way of thinking for the performance evaluation. This paper discusses the applicability of grey system theory in the performance evaluation of local government public service management in China.

4. Empirical analysis

Because the human body form development coordination led to the "fat" and "thin" phenomenon. Especially the problem has affected the fat of our young people's learning and life (Yu, 2014). Experts and scholars at home and abroad have studied the students' physique and health problems widely. Various governments have also taken various forms and channels to intervene. Hani people are one of the people living in Yunnan province. The study of the physical form of the students will help to promote the harmonious development of the ethnic groups in the border areas and the work of physical education in the schools. In this paper, the original data of 6 physical and health surveys of 7-18 Hani people in 1985-2010 years in Yunnan province were recorded. The paper uses the grey system theory GM (1,1) model. To establish a grey prediction model for the body shape of Hani students. The article calculated the physical form of the Hani students' body form in 2015 and 2020. This paper compares the physical form survey of seventh students of Hani nationality in Yunnan Province in 2015. Results the application of this method to the development of students' physique and healthy body shape index is scientific and effective.

4.1 The performance evaluation index

The article studies and draws on the performance evaluation index system in the related literature. This has established a grey relational analysis model to evaluate the performance of local government public service management (Kong, 2013). Through the empirical research on the performance evaluation of ten municipal governments public service management in Shaanxi province. This is an analysis of the main factors that affect the performance of the government's public service management in various prefectural level cities. This paper validates the applicability and effectiveness of the model (see table 1). At the end of the paper, according to the results of the evaluation, some suggestions for improvement are put forward in view of the problems reflected by the results.

Evaluation	Grey	GM	Sports	High school
Number	100	39	41	20
Percentage	100	27.5	57.5	15

Table 1 Grey Gm Index

The results show that the grey system theory GM (1,1) model is used to establish the grey prediction model of the body shape of Hani students. The model calculated the body shape of Hani students in 2015 and 2020, which was consistent with the law of adolescent morphological development. The result of model prediction accuracy is good. The trend of early maturity of students' morphological development has a good persuasiveness in the research topic (Zhang, 2016). Comparing the predicted value to the actual value, the result of the difference between the predicted value and the measured value is not significant. It has been proved by practice that the method of grey system theory GM (1,1) is used in the body shape of human body, which has certain guiding significance. This paper discusses the adaptive problem of combining the grey system theory with typical nonlinear characteristics and the evaluation of college campus safety (see table 2). This paper systematically analyzes the mechanism and rules of campus accidents in Colleges and universities.

Content	Factor	very	Satisfied	General	Dissatisfied	Very
		satisfied				dissatisfied
Current	Number	2	61	17	15	5
sports	percentage	7%	53%	20%	10%	10%
New sports	Number	11	74	9	5	1
	percentage	7.8%	52.2%	17%	17.7%	5%

Table 2 Students' Favourite Model

An analytical model reflecting the characteristics of campus accidents is established: following the principles of systematisms, simplicity and homogeneity, quantification, non-causality and exclusion. The article fully considers all kinds of factors that affect the safety of college campus (Ren, 2012). This paper constructs a more comprehensive evaluation index system of university campus safety. This makes every important influence factor in the course of college campus safety teaching to be reflected in the index system. In this paper, the original data collection table of university campus safety evaluation is compiled. The Nonlinear Grey Relational safety evaluation model is established. In this paper, the relative degree of correlation degree can be used to judge the relative security degree of campus security.

4.2 Knowledge and scientific means

Prediction is the use of all kinds of knowledge and scientific means. This analysis studies the historical data. This is a beforehand speculation and estimation of the trend and possible results of the system. The aim is to take appropriate measures according to the development and trend of the events. The effective control of college campus safety is of great significance to the safety of college teachers and college students. The prediction of college campus accidents is to predict the future system accident trend through the system existing or past accident information (Yang, 2010).

4.3 The dialectical relationship between macro and micro

This paper is based on the dialectical relationship between macro and micro, static and dynamic. In this paper, the basic principles of campus accident prediction are determined. This is a mathematical model for the grey prediction of nonlinear systems. The established system grey prediction model is adapted to the problem of insufficient historical data. In order to facilitate the dynamic management of university campus security, the paper is designed by the Microsoft Visual Studio2005 program. In this paper, a visual system software for campus safety management is developed. The software is convenient and easy to operate. Therefore, it is convenient for the statistics and inquiry of the basic data of the accident, the evaluation of campus safety and the prediction of the accident trend (Gui, 2003).

The cross-sectional area of the surfactant:

Wc=
$$-\Delta G=2\gamma_{g-1}$$
 (1)

 $\theta_{i} = \frac{a_{i}p_{i}}{1 + \sum_{i}^{i}a_{i}p_{i}}$

(2)

(3)

 $\delta = -\Delta G = \gamma_{g-s} - \gamma_{g-l} - \gamma_{l-s}$

Mixed adsorption:

Dissociated into two molecules:

The percentage of the surface covered.

$$\frac{p}{V} = \frac{1}{V_m a} + \frac{p}{V_m}$$
(4)

Langmuir isothermal formula:

 $\cos\theta = \frac{\gamma_{\rm s-g} - \gamma_{\rm l-s}}{\gamma_{\rm l-g}}$ (5)

Contact angle and wetting work:

$$V = V_{m} \frac{Cp}{(p_{s}-p)\left[1+(C-1)\frac{p}{p_{s}}\right]}$$
(6)

The liquid can be automatically spread on the surface of the solid.

 $\theta_{A} = \frac{ap_{A}}{1 + ap_{A} + a'p_{B}} \quad (7)$

The greater the WA value, the easier the liquid to moisten the solid, the stronger the liquid solid interface.

$$\theta_{\rm B} = \frac{a \dot{p}_{\rm B}}{1 + a p_{\rm A} + a \dot{p}_{\rm B}} \quad (8)$$

Adhesion work and cohesive work:

Spreading coefficient:

 $\theta = \frac{ap}{1+ap} = \frac{V}{V_m}$ (10)

 $\theta = \frac{a^{\frac{1}{2}}p^{\frac{1}{2}}}{1 + a^{\frac{1}{2}}p^{\frac{1}{2}}} \quad (9)$

5. Conclusion

This paper first analyzes the significance of higher education in the political, social, economic, scientific and cultural development. The article points out that university campus safety is an important problem that must be solved in the reform and development of higher education. Aiming at the problems in campus safety management and its evaluation, this paper proposes a research topic of Nonlinear Evaluation and prediction for campus safety. The author puts forward the author's unique views and methods, and has achieved the expected effect in the practical application. The campus security system of colleges and universities is a nonlinear system, which is composed of one person, one thing and one ring, and the space is extremely complex. Among them, people and natural factors coexist, robbery and robbery, sexual assault, poisoning, fire and traffic accidents are the main forms of accident in college campus. The mechanisms of these accidents are different. But the causes of these things are interrelated and interrelated. The traditional and predefined evaluation methods of change laws and characteristics have shown their limitations. This paper is based on the analysis of the nonlinear characteristics of the campus accident system.

References

[1] Fan, Y., Li-Ping, M. A., & School, M. (2017). Research on the fuzzy comprehensive evaluation model of college teachers' teaching quality evaluation based on Markova chain. Mathematics in Practice & Theory.

[2] Feng, C. (2017). An improved fuzzy comprehensive evaluation of public class teaching quality in college physical education based on grey system theory. Bulletin Technical/technical Bulletin, 55(6), 580-586.

[3] Gui, Ying, L. I. (2003). Research and design of teaching quality evaluation system based on fuzzy comprehensive evaluation. Journal of South China Normal University.

[4] Han, Y., Wang, Y., & Li, J. (2010). Research on the quality evaluation of college computer to classroom teaching based on fuzzy comprehensive evaluation. International Conference on E-Health Networking, Digital Ecosystems and Technologies (Vol.2, pp.43 - 46). IEEE.

[5] Hou, S. P. (2013). Teacher's teaching quality assessment in college based on hap and fuzzy comprehensive evaluation. Advanced Materials Research, 807-809, 2849-2853.

[6] Kong, Y. (2013). Application of hap and improved fuzzy comprehensive evaluation of classroom teaching quality evaluation in colleges and universities. Journal of Mathematical Medicine.

[7] Liang, G. M., & Yu, G. (2013). Research on evaluation of undergraduate teaching quality based on hap and fuzzy comprehensive evaluation. Higher Education of SsangYong University.

[8] Liu, F., Zou, P., & Le, K. E. (2014). Research on service quality evaluation of university library based on fuzzy comprehensive evaluation method: taking a university library of Yunnan as an example. Value Engineering.

[9] Liuqian, H. (2010). Application and Advantage of Fuzzy Comprehensive Evaluation in Appraisal of PE Teachers in Colleges and Universities. International Conference on Computer Science and Sports Engineering (pp.300-303).

[10] Peng, W. U., Hong-Ling, X. U., & Song, Q. J. (2016). Application of fuzzy comprehensive evaluation method based on cloud model in the evaluation of teaching reform of "electrical engineering". Higher Education Forum.

[11] Ren, Q. L., & Xiao-Yan, B. U. (2012). Research on teaching quality evaluation system based on fuzzy comprehensive evaluation method in higher vocational colleges. Journal of Wuhan Polytechnic.

[12] Wang, Y. W., Zhang, X. W., & Wang, J. P. (2012). Evaluation of classroom teaching quality in universities based on the improved fuzzy comprehensive evaluation model. Mathematics in Practice & Theory, 42(5), 10-16.

[13] Xiang, X. J., Zip, Li, Y. I., Yu-Zhuang, X. U., Luo, J. W., & Hoi, H. L. (2010). Design and implementation of teaching quality evaluation system in colleges and universities: based on fuzzy comprehensive evaluation method and browser/server structure. Journal of Hunan Agricultural University.

[14] Xie, X. Q. (2014). Research on fuzzy comprehensive evaluation of rumba quality of the public security. Financial Theory & Practice.

[15] Yang, X. S. (2010). Multi-level Fuzzy Comprehensive Evaluation of Physical Education Quality in Colleges and Universities. International Conference on Education and Sports Education (pp.267-270).

[16] Yu, F., Ye, L., & Zheng, J. (2014). Study on Fuzzy Comprehensive Evaluation Model of Education E-government Performance in Colleges and Universities. Rough Sets and Knowledge Technology. Springer International Publishing.

[17] Zhang, K., Goo, J., & Xiao, Z. (2016). Research on state evaluation method of transformer based on fusion of fuzzy comprehensive evaluation and improved d-s evidence theory. Engineering Journal of Wuhan University.